Digitizing the Historic USGS Maps of New England

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The Historic USGS Maps of New England Project was conceived in October 1998 and substantially completed in September 1999. The purpose of the project was to make valuable historical USGS topographic maps easily accessible through the Web. The 1,188-map archive represents complete geographical coverage of New England from the 1890s to 1950s.

Project Conception

Christopher Marshall of Amherst, New Hampshire, began scanning old topographic maps of New Hampshire out of personal interest. A map enthusiast with an interest in New Hampshire railroad history, he began searching out old maps in order to discover the locations of abandoned railroads and train stations. He found that current maps sometimes show old railroad right-of-ways, but sometimes those grades have been reused for newer roads, thus obscuring the old information. He needed the older maps, but found locating them problematic. Since area libraries had spotty collections and did not circulate the maps, Chris started to scan them in order to be able to examine them as a group. He started at his local public library and went from library to library until he reached us at the University of New Hampshire.

Although we have many more maps in our collection than Chris had previously found, he also had scanned images of maps we did not own. When I noticed the quantity and coverage of the images that Chris had already collected, I immediately saw the value of his collection. We've had a large number of inquiries over the years from patrons wishing to borrow, purchase or make color copies of our maps. I saw an opportunity to make a valuable collection easily available to a large number of people, while at the same time decreasing handling of our fragile collection and increasing our own library holdings. I approached Chris and asked if we could have the images to start a Web site, and the Historic USGS Maps of New England project was born.

Project History

The site started small, but like many projects it quickly took on a life of its own. Originally, Chris and I expected the collection to be comprised of only New Hampshire maps. In fact, I originally named the project The New Hampshire Historic USGS Map Collection. But with many of the maps covering both parts of Vermont and New Hampshire, it was soon obvious that adding Vermont would actually be easier than trying to figure out how to exclude it. Then, there was a whole series of maps that straddled the northern border of Massachusetts so adding Massachusetts became the obvious next step. At this point, I became stuck on a name for the expanded collection. The original name no longer worked, and the three-state grouping of New Hampshire, Vermont and Massachusetts made no sense. We think of New Hampshire, Vermont and Maine as Northern New England, but New Hampshire, Vermont and Massachusetts were not bound together by anything more than common borders. At this point, Chris was still doing all the scanning in his free time, and the size of the state of Maine prohibited an enthusiastic rush to the scanner. I asked Chris, at this point, if he would be willing or interested in expanding the scanning to the southern New England states of Connecticut and Rhode Island. A true map enthusiast, he agreed. Once these states were completed, Maine seemed somehow much smaller and New England was quickly completed.

Technology & Equipment

The majority of the maps were scanned on a Hewlett Packard HP 4C scanner with a maximum scan size of 8.5 by 14 inches. Since the maps tend to be about 20 by 27 inches, Chris scanned the maps in four overlapping quarters. He scanned the maps at a resolution of 200 DPI and saved them as TIFF images of about 14 MB each or 56 MB per map. He connected his scanner to a laptop computer armed with an external JAZ drive to store the large image files. The images were then converted to JPEG images approximately 1.4 MB in size using Paint Shop Pro software. These images are large enough to be readable and useful on screen or when printed while being small enough to download rapidly over our T1 lines and acceptably over most home users' modem lines.

Not only did I discover an avid map enthusiast in Chris, but also an accomplished computer programmer! When he and I first made arrangements for me to download the 80 maps Chris had scanned, I expected to have to spend a couple weeks writing HTML pages to present the images on the Web. Instead, Chris had written what he called "a little Java program" driven by a text-based catalog which includes each map's geographical coordinates to generate HTML pages linking to the scans. He had also written another program to generate the image maps that also link to the maps.

While the program saved countless hours of start-up time and created magnificent indexes that would have been largely impossible to create and maintain by hand, it also created a magnificent number of small errors. We had HTML pages for images that did not exist, or whose name had been misspelled at the scanning stage, and many misspellings, typos, and HTML coding errors. Many hours of my labor as well as approximately 250 hours of student labor went into correcting errors on the site. To this day, at least once or twice a month I'll get an e-mail from somebody pointing out a misspelling in the name of a local town, and many table coding errors still stand in need of correction. These types of corrections are often not easily discovered but can be easily corrected with a good HTML editor. I currently use Allaire HomeSite 4.5 but have recently purchased Adobe GoLive 5.0.

We run the site on a Dell Power Edge 2300 Server, 450 MHz, 256 MB memory, 54 GB hard drive, and 12 GB tape drive, running Windows NT 4.0 and Internet Information Server 4.0 software.

Since the original scanning was done, we have purchased a Microtek ScanMaker 9600XL scanner capable of scanning images up to a size of 12 by 17 inches. I use Adobe Photoshop 5.5 and ImageReady 2.0 to adjust and resize images for the Web. As time permits, I will use this software to reduce the current JPEG images to an even smaller size.

We have also purchased software called Panavue ImageAssembler, which allows the four overlapping scans of a map to be stitched together into a single, perfect image. We are in the process of purchasing LizardTech's Mr. Sid image compression software, which will allow us to present the images in an even user-friendlier format.

We have an Epson Color Stylus 2000 printer capable of printing images of 13 x 19 inches. Although we are unable to allow patron access to this because of current limitations on our library printing systems, we are able to make prints upon request.

We have assembled an archive of the original TIFF images on 12 GB tapes. Those images currently fill 9 tapes for a total of 108 GB. We have created an index to the images on these tapes from the filenames in each tape's directory so that we can retrieve the TIFF images when needed. Retrieving these images is a slow and aggravating process that will be alleviated when we are able to add more storage space to our current server.

Project Financing

- May 1997: Received a UNH Parents Association Grant for $6215 to purchase a server to serve as a campus wide resource for students in the social sciences. This was the second server used by the department.

- March 1999: Received library funds for $7200 to purchase a Dell Power Edge 2300, 450 MHz with two 18 GB mirrored hard drives running Windows NT Server.

- April 1999: Received a UNH Parents Association Grant for $1399 to purchase a Microtek ScanMaker 9600XL large format scanner. The scanner will scan sheets up to 12 x 17 inches at 600 x 1200.

- July 1999: Received library funds for $750 to add two 18 GB hard drives for Windows NT server.

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Statistics & Space Requirements

HTML Pages

Quad HTML	725 files	4.27 MB

pages		
Town HTML pages	1898 files	3.48 MB
Total	2623 files	8.75 MB

Images

Massachusetts	1603 JPEGs	401 maps	2.69 GB
Connecticut	735 JPEGs	184 maps	1.25 GB
Maine	1329 JPEGs	332 maps	2.20 GB
New Hampshire	450 JPEGs	113 maps	829 MB
New York	128 JPEGs	32 maps	218 MB
Province of Quebec	4 JPEGs	1 map	8 MB
Rhode Island	137 JPEGs	34 maps	205 MB
Vermont	362 JPEGs	91 maps	703 MB
TIFF Images	4748 TIFFs	1188 maps	108 GB
Total	4748 images	1188 maps	116 GB

Usage Statistics

Server logs show that the site attracts an average of 6000 visits (including us) per month.

Publicity

I sent announcements to the Maps-L and GOVDOC-L lists, and Chris posted an announcement to a map newsgroup. The site was mentioned in *The Scout Report for Science and Engineering* on 27 October 1999. Chris was asked to write an article about the site for the *Boston Map Society Newsletter.* The site was announced in the *NEMO*

Newsletter (Quarterly Newsletter of the North East Map Organization), Number 33, March 1999, and in *Granite State Libraries,* Volume 35, Number 2, March/April 1999. The site was mentioned in UNH's *Campus Journal* on 25 February 1999. The majority of the publicity for the site, however, has been by word of mouth.

Benefits to the Library

- Increased the holdings of our collection by the number of scans collected from 11 other libraries and one bookstore.
- Generated a donation by local map collector Representative Richard Ahern of 72 historic New Hampshire maps.
- Aids in protecting our fragile paper collection by allowing general access to digital versions.
- The project quickly became a high profile, easy to demonstrate showpiece for library fundraising efforts.
- Allowed the library to make a contribution to the growing collections of research material available on the Web.
- Serves as a companion effort to our role as an ESIC.
- Establishes the Government Documents Department as a major player in the library's emerging digital initiative.
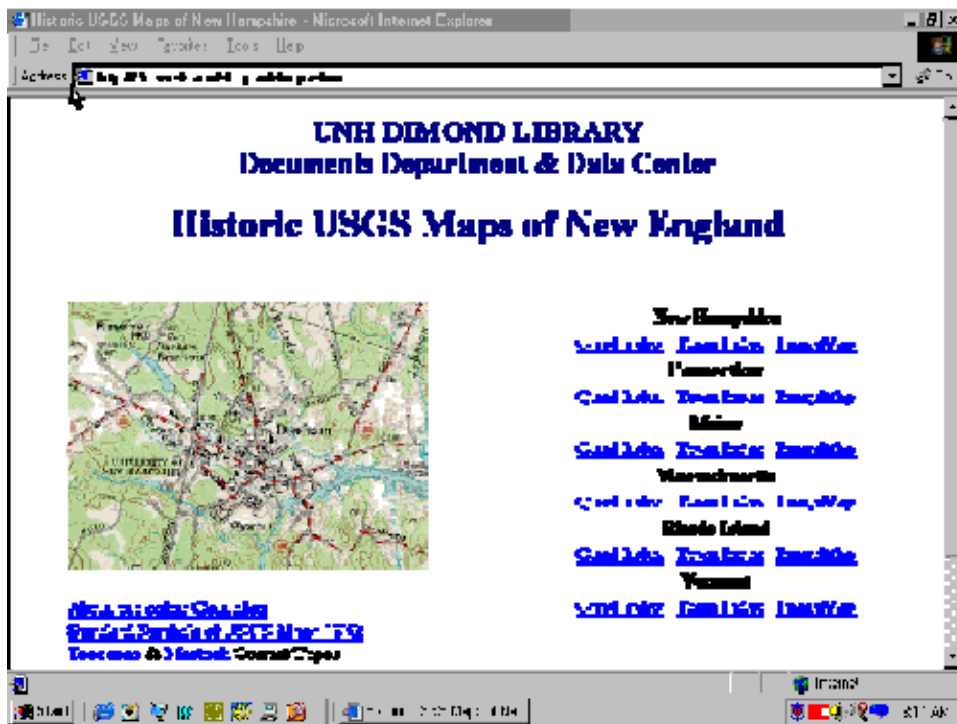
Future Plans

The site is still a work in progress. Users still email me with corrections in spelling of town names. This winter, I need to begin re-coding the site to repair problems and replace deprecated HTML code with style sheets. Site navigation will eventually be improved.

1. Three additional digital collections are in the works:
   - *Town and City Atlas of the State of New Hampshire* published in 1892 by D.H. Hurd. Organized by county, the atlas contains maps of every town and for most towns contains detailed maps of the town center. In many cases, homes with owner's names are shown. Two of New Hampshire's ten counties have been scanned already.
   - *Atlas Accompanying the Report on the Geology of New Hampshire* by State Geologist C.H. Hitchcock, 1878. These maps, which accompany a five-volume report, are the first statewide compilation of New Hampshire geologic history. They would be valuable to researchers used in comparison with current, readily available images. The volume is scanned.
   - *Maps from the US Congressional Serial Set.* This set is very fragile. The maps are frequently folded and printed on thin paper, and thus at greater risk than the text portions of the set. Our Special Collections is planning to establish a Digital Copy center where we will be able to scan and serve a collection of Serial Set maps illustrating New Hampshire.
2. We are about to purchase LizardTech's Mr. Sid image compression software for use on these projects. I hope to use this technology in the same way it is being used by the Library of Congress' American Memory Project, to offer these maps in a more user friendly format on the Web. Eventually I hope to stitch and compress the entire topographic map collection.

3. We have not created formal records for the online collection either through traditional MARC cataloging or alternative forms of metadata such as Dublin Core or Federal Geographic Data Committee (FGDC). This is an area that is currently being explored.
4. USGS topographic maps are constantly revised, but we ended our historic map project with maps from the 1950's. Maps published in the last forty years document many significant changes in New England. We are considering including more recent maps in the Web site, especially those from New Hampshire, many of which are in our paper map collection and thus readily available for scanning.

Conclusion

Digitization projects are perhaps technically more challenging than print publishing, but are certainly more pliable. We were able to quickly gather the images into a coherent collection on the Web, and then allow both the original concept and the collection to grow and change. The flexibility of Web publication allowed this project to plan itself to some extent, and fostered a collaboration of two people with different goals and skills to produce a valuable research source.

http://docs.unh.edu/nhtopos/nhtopos.htm